

What is claimed is:

1. A magnetic recording and reproducing apparatus of a helical scan system capable of writing or reading signals simultaneously to or from a plurality of tracks while winding a magnetic tape to a rotary drum diagonally, said apparatus comprising:

at least one multitrack write head having  $N$  ( $N$  being an integer of 2 or more) write elements arranged on the rotary drum along a track width direction in an integral fashion; and

at least one multitrack read head having read elements arranged along the track width direction in an integral fashion are formed on the rotary drum, the number of the read elements being an integral multiple of  $N$ ;

wherein the multitrack write head writes signals to a group of  $N$  signal tracks aligned parallel on the magnetic tape during one rotation of the rotary drum; and

wherein the multitrack read head reads the group of  $N$  signal tracks by the use of any one of the read elements.

2. The magnetic recording and reproducing apparatus according to claim 1, further comprising

a controller for controlling a magnetic tape feed rate in reading the signals, wherein

the multitrack write head writes pilot signals

having different pilot frequencies to N signal tracks belonging to a group of signal tracks of an identical azimuth, the pilot frequencies of the adjacent signal tracks being different from each other;

the multitrack read head reads the pilot signals from a signal track to be reproduced and another signal track; and

the controller controls the tape feed rate based on a ratio of the pilot signal component to be reproduced.

3. The magnetic recording and reproducing apparatus according to claim 1, wherein

azimuth angles of the write elements of the multitrack write head and the read elements of the multitrack read head are set to an identical value;

a read width of each of the read elements of the multitrack read head is set to substantially  $1/2$  of a signal track width formed on the magnetic tape;

repetition interval of the read elements in the track width direction is set to  $1/2$  of a signal track pitch; and

the multitrack read head reads signals in accordance with a non-tracking system from the group of signal tracks.

4. The magnetic recording and reproducing apparatus according to claim 1, further comprising

a controller for controlling movement of the

multitrack read head in the track width direction in reading the signals, wherein

the multitrack write head writes servo signals to predetermined regions of the magnetic tape;

the multitrack read head reads the servo signals;  
and

the controller detects a tracking shift amount based on timings at which the servo signals to be reproduced are read to control positioning of the multitrack read head.

5. A magnetic recording method of a helical scan system for writing signals simultaneously to a plurality of tracks while diagonally winding a magnetic tape to a rotary drum, comprising:

forming a group of  $N$  ( $N$  being an integer of 2 or more) signal tracks aligned parallel on the magnetic tape during one rotation of the rotary drum, wherein

a width of one of the  $N$  signal tracks positioned most downstream with respect to a tape running direction is larger than that of the other or other signal tracks.

6. The magnetic recording method according to claim 5, wherein

the  $N$  signal tracks have an identical azimuth angle.

7. A magnetic recording method of a helical scan system for writing signals simultaneously to a plurality of tracks while diagonally winding a magnetic tape to a rotary

drum, comprising:

forming signal tracks of  $M$  ( $M$  being an integer of 2 or more) groups each consisting of  $N$  ( $N$  being an integer of 2 or more) signal tracks aligned parallel on the magnetic tape during one rotation of the rotary drum, wherein

the parallel  $N$  signal tracks of one of  $M$  groups have an identical azimuth angle and

azimuth angles of the adjacent groups each consisting of the  $N$  signal tracks are different from each other.

8. A magnetic reproducing method of a helical scan system for reproducing signals simultaneously from a plurality of tracks while diagonally winding a magnetic tape to a rotary drum,

the signals being servo signals written to predetermined regions of the magnetic tape, comprising:

setting a track width of a multitrack read head to be used for reading the signals to a smaller value than a track width formed on the magnetic tape; and

controlling positioning of the read head in a track width direction by detecting a tracking shift amount based on timings at which the read head reads the servo signals.

9. A multitrack thin film magnetic head comprising a plurality of magnetic write elements formed on a substrate, wherein:

the n-th (n is natural number) thin film magnetic write element and the (n+1)-th thin film magnetic write element are formed on the substrate with a predetermined shift in a track width direction being provided therebetween and

the magnetic write elements have such a structure that a protection film extending along a direction of film deposition is formed therebetween.

10. The multitrack thin film magnetic head according to claim 9, wherein

a shield member made from a highly magnetic permeable material is formed between the n-th thin film magnetic write element and the (n+1)-th thin film magnetic write element, the shield member having a width larger than those of cores being exposed to sliding surfaces of both of the thin film magnetic write elements and being exposed to the sliding surfaces.

11. The multitrack thin film magnetic head according to claim 9, wherein

a lower core of the (n+1)-th thin film magnetic write element is formed in such a fashion that the lower core extends in a direction of the sliding surface and at least covers an upper core of the n-th thin film magnetic write element.

12. A magnetic multitrack read head having a

plurality of magnetic read elements formed on a substrate, wherein

the magnetic read elements are magnetoresistive effect elements and

the n-th (n being a natural number) thin film magnetic read element and the (n+1)-th thin film magnetic read element are formed on the substrate with a predetermined distance extending in a track width direction being defined therebetween.

13. The magnetic multitrack read head according to claim 12, wherein

the n-th (n being a natural number) thin film magnetic read element and the (n+1)-th thin film magnetic read element are formed on different planes on the substrate with a protection film layer formed therebetween.

14. A magnetic recording and reproducing apparatus of a helical scan system capable of writing or reading signals simultaneously to or from a plurality of tracks while winding a magnetic tape to a rotary drum diagonally, said apparatus comprising:

at least one multitrack write head having N (N being an integer of 2 or more) write elements arranged on the rotary drum along a track width direction in an integral fashion; and

at least one multitrack read head having read

elements arranged along the track width direction in an integral fashion are formed on the rotary drum, the number of the read elements having  $L$  ( $L$  being an integer equal to or more than  $N$ );

wherein the multitrack write head writes signals to a group of  $N$  signal tracks aligned parallel on the magnetic tape during one rotation of the rotary drum; and

wherein the multitrack read head reads the group of  $N$  signal tracks by the use of any one of the read elements.